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Spaceport News

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Mock countdown marks Discovery's final TCDT

By Elaine M. Marconi
Spaceport News

3, 2, 1 and … and well, no launch. It's not an aborted liftoff; it's TCDT, the Terminal Countdown Demonstration Test.

Prior to every launch, the current mission's astronauts and ground crews participate in launch-related activities at Kennedy Space Center for their final on-site preparations before liftoff. The week of Oct. 11, space shuttle Discovery's STS-133 crew members were here prior to their scheduled Nov. 1 launch to the International Space Station.

During a few days at Kennedy, Commander Steve Lindsey, Pilot Eric Boe, and Mission Specialists Alvin Drew, Michael Barratt, Nicole Stott and Tim Kopra checked the fit of their spacesuits, practiced emergency evacuation procedures at the launch pad, checked out their mission's cargo in the shuttle's payload bay, reviewed firefighting methods, and participated in briefings on security and range safety.

Closeout Crew Lead Travis Tod Thompson, with United Space Alliance, has been assisting each mission's crew for more than 27 years during TCDT and on launch day. Thompson's first assignment was supporting the crew of Challenger's STS-8 mission in 1983.

NASA/Jim Grossmann

Kevin Heard with NASA Quality Control, left, and Closeout Crew Lead Travis Tod Thompson assist STS-133 Mission Specialist Michael Barratt during a simulated launch countdown Oct. 15.

TCDT frequently is the first time members of the crew have an opportunity to see the flight hardware and launch pad. Until this time, training has been on simulators and with computer programs at their home base at NASA's Johnson Space Center in Houston.

This training allows them to familiarize themselves with the spacecraft, become acclimated with the safety equipment and procedures and become comfortable with the White Room and the emergency measures that may have to be put into action, if necessary, on launch day.

"It's great for us to get comfortable with them during TCDT and for them to get comfortable with us and their surroundings -- it's just a big help. The dress rehearsal helps to get rid of a lot of butterflies, plus gives us more time with them to learn what they're going to need on launch day," said Thompson. "Anything we can do to make launch day go smooth is well worth it."

The astronauts also received instruction on hopping into the launch pad's slidewire baskets and drove the M-113 armored personnel carriers as part of their emergency pad escape training.

According to Thompson, the slidewire baskets have been part of the pad's emergency egress system since STS-1, but have never been used for an emergency. But if the White Room had to be evacuated quickly, fire nozzles that spray heavy amounts of water would activate and the teams would only be able to see their feet. Painted on

See **TCDT**, Page 2

Follow along from the firing room

Scheduled to launch Nov. 1 at 4:40 p.m., Discovery and its STS-133 crew will embark on an 11-day mission to deliver a new module, critical spare parts and a humanoid astronaut helper to the International Space Station.

Live countdown coverage from Firing Room 4 of Kennedy Space Center's Launch Control Center will begin with fueling commentary at 7:10 a.m. on NASA TV or at **www.nasa.gov/ntv**. Continuous launch coverage will begin at 11:15 a.m. NASA's Launch Blog begins simultaneously at **www.nasa.gov/mission_pages/shuttle/launch/launch_blog.html.** Follow Kennedy on Twitter at **www.twitter.com/nasakennedy** or on facebook at **www.facebook.com/nasakennedy**.

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NASA/Jim Grossmann

Mentors share expertise on Disability Mentoring Day

More than 40 mentors shared information about their jobs with people with disabilities on Disability Mentoring Day around Kennedy Space Center. The event, on Oct. 20, is part of a nationwide effort to promote career development for students with disabilities through hands-on career exploration.

Right: NASA Education Program Specialist Helen Kane, left, shows Melbourne High sophomore Autumn Tillis how to enter data setting up a meeting presentation at Headquarters.

Above: Graphic Specialist Jerry Forney, with Abacus Technology Corp., right, introduces Adobe Photoshop to Palm Bay senior Zachery Page.

Left: NASA Design Engineer Dr. Felix A. Soto-Toro, right, demonstrates to Eau Gallie High senior Anthony Pagan the ground support equipment fabricated by NASA Prototype Shop technicians. These prototype umbilical plates are constructed to prove the design concept for the flight-to-ground interface used during preflight processing and testing of a flight vehicle.

From **TCDT**, Page 1

the open grating of the pad floor is a bright-yellow path marked with black chevrons, or arrows, which point the way to the slidewire baskets. Thompson mentioned that these path markings are commonly referred to as "the yellow brick road."

Another aspect of TCDT, explained Thompson, is the M-113 armored personnel carrier emergency egress vehicle driver training. Instruction is provided by Kennedy's fire chief and every crew member gets a chance to ride in and drive the M-113. Typically, Thompson joins the crew in the field, and this is the first time he meets them.

"This exercise gives me a good time to get to know the crew a little bit on a comfortable basis -- before we really have to do a lot of work. And it's fun for them and they like it," Thompson said.

In addition to pad and field training, Lindsey and Boe practiced touch-and-go landings in NASA's Shuttle Training Aircraft -- Gulfstream jets that have been modified to simulate the orbiter's unpowered, high-speed glide -- at Kennedy's Shuttle Landing Facility.

TCDT has changed and evolved throughout the years, recalls Thompson. "We've grown in crew size, from two crew members on STS-1 through 5, and then it was expanded to four, and then up to seven."

Thompson's crew shows up at the launch pad at about 5 a.m. for the full launch dress rehearsal and prepares the White Room, located in the pad's rotating service structure, for the astronauts' arrival about three hours later.

That's when the launch countdown moves into its final phase. It takes about 50 minutes for the flight crew to board the shuttle and the hatch to be closed, Then, they run through all of the operations and communications checks of a real launch, right down to a mock engine start.

Thompson talked about a tradition he's followed through the years at the pad on launch day. He tells of a large pipe on the 195th level that has liquid oxygen running through it that frosts up and develops an ice buildup. Before the flight crew arrives, Thompson scrapes the STS mission number in the frost along with a "thumbs-up" print.

NASA/Kim Shiflett

The STS-133 crew takes a break from a simulated launch countdown to ham it up on the 195-foot level of Launch Pad 39A at Kennedy Space Center. From left are, Pilot Eric Boe, Mission Specialist Michael Barratt, Commander Steve Lindsey, and Mission Specialists Tim Kopra, Nicole Stott, and Alvin Drew.

"It's kind of our way of telling them we're behind them . . . kind of a personal note to them. It's one of the cool things about the pad that many people don't know about. And it doesn't happen every day. It only happens on launch day -- it's special."

It's evident how much satisfaction Thompson and his team gets out of the work they do keeping the astronauts safe and comfortable during training and on launch day.

"I take a lot of pride in that, and I'm happy that I can say that some of them are my friends."

Alpha Magnetic Spectrometer already collecting data

By Steven Siceloff
Spaceport News

The Alpha Magnetic Spectrometer-2 (AMS) destined for the International Space Station already is collecting cosmic ray signatures, even as it sits in a work stand at the Space Station Processing Facility at Kennedy Space Center, said Professor Samuel Ting, the principal investigator for the program.

It's not making any grand discoveries yet, since the particles it is picking up were stripped of some of their qualities when they passed through Earth's atmosphere. But once in place aboard the space station, the 7 1/2-ton AMS will see charged particles as they exist in the vacuum of space.

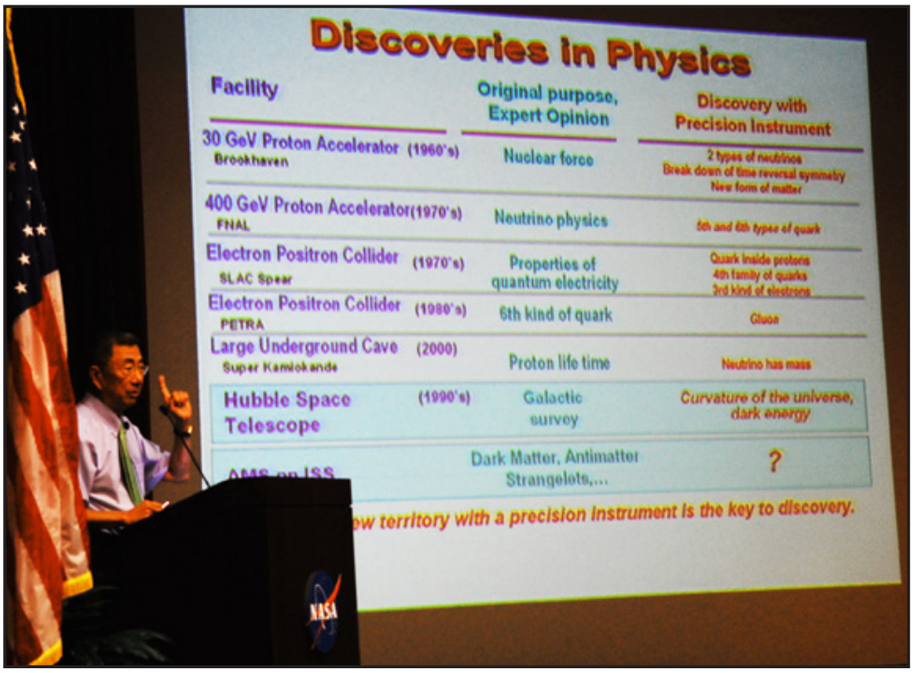
Space shuttle Endeavour is to carry the AMS to the station in February 2011, and mount it on the truss that holds the orbiting laboratory's main solar arrays.

So what does Ting expect AMS to find? Speaking to a standing-room-only audience for the Kennedy Engineering Academy on Oct. 19, Ting said he doesn't know what the detector will find.

"Expert opinion is based on existing knowledge," he said. "Discovery breaks down existing knowledge."

Ting won the Nobel Prize in Physics in 1976 along with Burton Richter for their discovery of a heavy elementary particle.

Though he doesn't know exactly what to expect, Ting has several ideas of what he hopes to find using the AMS, including the possibility that it opens up an entirely new field of particle physics. Up until now, he said, the study of cosmic rays has been limited to measuring light using telescopes and instruments like those on NASA's Hubble Space Telescope.



NASA/Jim Grossmann

Professor Samuel Ting talks to employees about the Alpha Magnetic Spectrometer-2 (AMS) on Oct. 15 in the Training Auditorium at Kennedy Space Center. Ting is the particle physics detector's principal investigator at the Massachusetts Institute of Technology. AMS is designed to operate as an external module on the International Space Station. It will use the unique environment of space to study the universe and its origin by searching for dark matter. AMS will fly to the station aboard space shuttle Endeavour's STS-134 mission targeted to launch Feb. 27, 2011.

The AMS is to be the first to study charged particles in space, he said.

One of his desires is that the particles recorded by AMS prove the existence of a parallel universe made up of anti-matter, or particles that are, in electrical charge and magnetic properties, the exact opposite of regular particles. Such a universe has been theorized, but not proven. The discovery of massive amounts of anti-matter could answer fundamental questions about the universe's origin.

"Unless you do the experiments, you don't know who is right," Ting explained.

Ting also is searching for proof of what makes up dark matter, the theoretical material that is thought to make up a large part of the universe. Also, AMS may point out whether all matter in the universe is made up of the same two kinds of subatomic particles, quarks, that make up all the known matter on Earth.

Designing such an experiment, especially one that works in the harsh and unforgiving environment of space, did not happen quickly and Ting says he was taken aback by how difficult it was.

"I did not realize there is really a big difference between doing an experiment on the ground and doing an experiment in space," he said.

Although new particle accelerators were being built on Earth, Ting said he set out to study cosmic rays in space because, "no matter how large an accelerator you build, you can't compete with space."

For example, cosmic rays produce particle energy almost a hundred million times more powerful than the world's largest particle accelerator is capable of, he said.

Ting's work on AMS started in 1994 with a meeting with then-NASA Administrator Dan Goldin. The project grew from there to incorporate more than 500 physicists in some 16 nations around the world. Mostly built in Europe and Asia, the AMS effort also received help from its project office at NASA's Johnson Space Center and from the Department of Energy.

The experiment is filled with cutting-edge technology. It relies largely on a ring of powerful magnets that influence the particles as they move through the AMS. The magnets were changed after Ting's team opted to replace the superconducting versions that would last three years with magnets which did not need to be cooled, but would let the experiment run many years longer, possibly as long as the space station itself is operational.

A series of detectors will pick up the ray's movements, in particular how their paths change as they pass through the magnets. Ting said different particles leave unique signatures that researchers will comb through to determine how much anti-matter exists and the nature of it.

> *"Expert opinion is based on existing knowledge. Discovery breaks down existing knowledge."*
>
> **Professor Samuel Ting,**
> Massachusetts Institute of Technology

The device also requires specialized electronics that run 10 times faster than current space electronics. The electronics have to be so much faster because the cosmic rays AMS will detect move so fast.

The AMS detector was tested in a couple ways. First, a smaller prototype was flown on board space shuttle Discovery in 1998 to prove the concept would work. Shortly before being flown to Kennedy, the AMS was placed in the Large Hadron Collider at Cern, Switzerland. The particle accelerator, the world's largest, was used to help set up the AMS instrumentation.

Buoyed by extensive support in the scientific community, Ting said he was able to overcome numerous sticking points along the way to get AMS built and ready to launch on a shuttle.

"If people believe in you, they will find a way to support you," he said.

Scenes Around Kennedy Space Center

For NASA

Kennedy Space Center's Education Office and Space Florida host 19 undergraduate students from the University of Miami on Oct. 15. This photo was submitted by visit organizer and Space Florida Academy alumna Kiran Bhimani.

NASA/Kim Shiflett

Business leaders interested in learning more about government contracting and what local and national vendors have to offer walk through the Business Opportunities Expo 2010 in Cruise Terminal 3 at Port Canaveral, Fla., on Oct. 19. The annual trade show is sponsored by Kennedy Space Center's Prime Contractor Board, the 45th Space Wing and Canaveral Port Authority. It featured about 175 business and government exhibitors from across the nation and Brevard County. NASA's Central Industry Assistance Office provides support to small businesses that want to do business at Kennedy. This office works with the Kennedy Prime Contractor Board, which consists of many of the center's prime contractors to help small businesses learn how to navigate in the world of government contracting. By co-sponsoring the expo, the board helps provide a one-stop shop for buyers and sellers.

NASA/Carl Winebarger

Eric Reyier with Innovative Health Applications LLC, left, along with Harold Morrow and James Lyon with the U.S. Fish and Wildlife Service help a green sea turtle move into deeper water at the Merritt Island National Wildlife Refuge on Oct. 14. The female turtle, weighing about 350 pounds, became stuck on an impoundment in fresh water near Kennedy Space Center's Launch Pad 39A.The refuge is a habitat for more than 310 species of birds, 25 mammals, 117 fishes and 65 amphibians and reptiles.

For NASA

In the Space Life Sciences Laboratory, from left, Tracy Gibson, Sarah Snyder, Steve Trigwell and Lily Fitzpatrick honor 'Pink Friday' on Oct. 15 by donning pink to help raise awareness in the fight against breast cancer.

NASA/Jim Grossmann

Gilberto "Gil" Colón, special assistant to the deputy director at Goddard Space Flight Center, addresses attendees of the 2010 Hispanic Heritage Luncheon on Oct. 14. The event, sponsored by the Hispanic Outreach and Leadership Alliance, was held in the Debus Center at the Kennedy Visitor Complex. This year's theme is "Heritage, Diversity, Integrity and Honor: the Renewed Hope of America."

Spaceport News wants your photos, ideas

Send photos of yourself and/or your co-workers in action for possible publication.
Photos should include a short caption describing what's going on, with names and job titles, from left to right.
Also, if you have a good story idea chime in.
Send your story ideas or photos to:

KSC-Spaceport-News@mail.nasa.gov

Photo courtesy of Al Scotti Photography

The National Space Club Florida Committee hosts its annual Space Ball on Oct. 16 at the Radisson Resort at the Port in Cape Canaveral. URS Corp., pictured above, was one of 19 industry companies that bought a table at the event.

Timing crew keeps eye on launch countdown clock

By Linda Herridge
Spaceport News

All eyes will be riveted on the giant digital display clock at Kennedy Space Center's Press Site as countdown commences for the upcoming launch of space shuttle Discovery.

The famous landmark displays the precise hours, minutes and seconds leading up to and after spectacular shuttle liftoffs.

The countdown clock and many other clocks around the center are maintained and exactly set by the IMCS Timing and Imaging Technical Support Group with QinetiQ. From a room in the Launch Control Center, Lead Electronic Technician Robert Wright and several timing technicians monitor and distribute the official time to facilities at the center, including the Launch Control Center firing rooms.

During launch countdown and preflight tests, the timing room is staffed 24/7. The group sets and monitors several panels of timer controls. Above the panels are digital clocks that display various times, including the launch window remaining, hold time remaining, the countdown clock time and GMT time.

They also support preflight tests, such as the Terminal Count Demonstration and the Shuttle Final Countdown Phase Simulation, a launch team training exercise.

"Timing is critical to us," said Steve Payne, who is a NASA shuttle test director at Kennedy. "The launch window is very limited and it is very important that all of the clocks are displaying and counting down the correct time."

For shuttle launches, Payne said call to stations is usually 73 hours before the actual launch time.

At that time, the NASA test director communicates with the Ground Launch Sequencer engineers and they in turn, talk to the timing group and give the "go" to start the countdown clock.

"We double and triple check our times. We target launch times down to the second, and things happen quickly as we approach T-0. These numbers are critical to us and they must be correct," Payne said.

The group sends the timing signals to all of the computer system servers in the firing rooms, the ground launch sequencers, Launch Complex 39, the Shuttle Landing Facility Control Tower, Vehicle Assembly Building, Orbiter Processing Facilities, Central Instrumentation Facility, Operations and Checkout Building, Space Station Processing Facility, and the News Center.

"We are the source for the official launch and landing time," Wright said. "We have redundant systems in case there are power failures or glitches in the system."

Wright said they also send the precise timing signal to Johnson Space Center in Houston, Marshall Space Flight Center in Huntsville, Ala., NASA Headquarters, Wallops Flight Facility in Wallops Island, Va., Goddard Space Flight Center in Greenbelt, Maryland and the Morrell Operations Control Center at Cape Canaveral Air Force Station.

During launch countdown, timing signals also are sent to a predetermined number of universal camera sites located near and around the launch pads and the Banana Creek viewing site for the high-speed cameras.

The countdown clock at Kennedy's News Center will begin ticking down at 2 p.m. on Oct. 30 for Discovery's STS-133 mission to the International Space Station at 4:40 p.m. Nov. 1.

NASA/Kim Shiflett

Lead Electronic Technician Robert Wright, with the IMCS Timing and Imaging Technical Support Group, says the group sends the precise timing signal to locations nationwide.

NASA/Kim Shiflett

Lead Electronic Technician Robert Wright, with the IMCS Timing and Imaging Technical Support Group, monitors several panels of timer controls during a launch dress rehearsal called the Terminal Countdown Demonstration Test.

> *"We double and triple check our times. We target launch times down to the second, and things happen quickly as we approach T-0."*
>
> **Steve Payne,**
> NASA shuttle test director at Kennedy Space Center

NASA/Jim Grossmann

The countdown clock is one of the most watched timepieces in the world. On Jan. 21, 2000, the clock at Kennedy Space Center's Launch Complex 39 Press Site was added to the U.S. National Register of Historic Places.

NASA/Jack Pfaller

The 2010 Tour de KSC started at 8 a.m. and went until noon Oct. 23 at Kennedy Space Center. The diverse group included experienced riders pedaling faster than 25 mph at times. More than 600 registered.

Second annual Tour de KSC kicks off CFC

By Steven Siceloff
Spaceport News

Hundreds of bicyclists mingled with spacecraft Oct. 23 as Kennedy Space Center employees, families and guests pedaled around the center for the second Tour de KSC.

Grouped by speed and skill levels, some riders covered all the landmarks Kennedy has to offer, including the Vehicle Assembly Building, both shuttle launch pads and the Shuttle Landing Facility. Plenty of stops along the way offered employees and their guests photo opportunities with space shuttle Discovery on Launch Pad 39A.

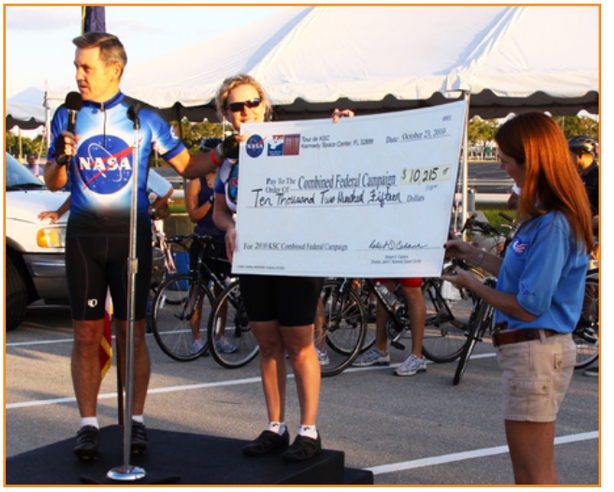
The entry fee for each person included a donation to the Combined Federal Campaign and organizers of this year's event were able to contribute $10,215 to the annual fundraising drive. Riders also received a T-shirt.

Kennedy Center Director Bob Cabana, a former astronaut and avid cyclist, led a group out from the Kennedy Visitor Complex then up to the Vehicle Assembly Building.

The diverse group included experienced riders pedaling faster than 25 mph at times, complete with colorful spandex cycling "kits," children making their first distance rides and plenty of recreational wheelers who were happy to have the rare opportunity to see the space center on two wheels.

This was the second Tour de KSC. Last year's inaugural event also opened the CFC season.

Officials plan to host the event again next year.



NASA/Jack Pfaller

Kennedy Center Director Bob Cabana holds a check showing a donation of $10,215 to the Combined Federal Campaign from the 2010 Tour de KSC.

NASA/Jack Pfaller

NASA/Jack Pfaller

Bicyclists covered all the landmarks Kennedy Space Center has to offer, including the Vehicle Assembly Building, left, both shuttle launch pads, the Shuttle Landing Facility and the crawlerway, right.

Upcoming events . . .

Oct. 30	KSC Fall Flea Market; 8:30 a.m. to 4 p.m.; KARS Park I, 1300 East Hall Road; All KSC and CCAFS employees invited. POC: Annette Myers, 867-0431
Oct. 31	KSC Fall Festival on Halloween; 5 to 9 p.m.; KARS Park I, Area 1; Badged employees and their families. POC: Amy O'Brien, 867-8408 or **amy.obrien@nasa.gov**
Oct. 31 to Nov. 1	STS-133 Camp and View at KARS Park 1; For questions about camping rates and to make reservations, call Annette Myers at 867-0431. POC: Amy O'Brien, 867-8408 or **amy.obrien@nasa.gov**
Nov. 2	BlackBerry and iPhone training classes; 5 to 9 p.m.; Headquarters, Room 2157. POC: Lisa Valencia, 525-9614 or **lisa.m.valencia@nasa.gov**
Nov. 16-18	The SharePoint Power Users training; 8 a.m. to noon; Operation and Checkout Building, Room 2245; Registration is open until Nov. 12. POC: Laura Thayer, 867-2149 or **laura.f.thayer@nasa.gov**

Looking up and ahead . . .

Nov. 1	Launch/KSC: Discovery, STS-133; 4:40 p.m. EDT
Targeted for Nov. 15	Launch/CCAFS: Delta IV Heavy, NROL-32; TBD
No Earlier Than Nov. 18	Launch/CCAFS: SpaceX Falcon 9, COTS-1; Launch Window 9 a.m. to 1 p.m. EST
Targeted for Jan. 22, 2011	Launch/CCAFS: Atlas V, SBIRS GEO-1; TBD
Targeted for February	Launch/CCAFS: Atlas V, GPS IIF-2; TBD
Feb. 23, 2011	Launch/VAFB: Taurus, Glory; 5:10 a.m. EST
Targeted for Feb. 27, 2011	Launch/KSC: Endeavour, STS-134; 3:38 p.m. EST
No Earlier Than April 14, 2011	Launch/CCAFS: SpaceX Falcon 9, Dragon C2; TBD
No Earlier Than June 6, 2011	Launch/CCAFS: SpaceX Falcon 9, Dragon C3; TBD
No Earlier Than June 9, 2011	Launch/VAFB: Delta II, Aquarius / SAC-D Satellite; TBD
Aug. 5, 2011	Launch/CCAFS: Atlas V, Juno; Launch Window 11:54 a.m. to 12:24 p.m. EDT
Aug.15, 2011	Launch/ Kwajalein Atoll, Reagan Test Site: Pegasus, NuSTAR; TBD
Sept. 8, 2011	Launch/CCAFS: Delta II Heavy, GRAIL; 8:35:52 a.m. and 9:14:35 a.m. EDT
Oct. 18, 2011	Launch/VAFB: Delta II, NPP; TBD
No Earlier Than Nov. 25, 2011	Launch/CCAFS: Atlas V, Mars Science Laboratory; TBD

WORD ON THE STREET

What should NASA do to commemorate the final launch of the space shuttle?

"Erect a bronze monument at Space View Park or the Rocket Garden. Something that will stand the test of time."

Donna Masters,
with United Space Alliance

"Bring in the Blue Angels, the Thunderbirds . . . along with a huge fireworks show shot from a barge in the Atlantic Ocean."

Terry Zaperach,
with QinetiQ

"Have an employee party in and around the Vehicle Assembly Building immediately after the STS-135 launch."

Robert Holl,
with NASA

"Family members of workers should get to come in. Especially those whose who have to work during launch."

Harvey Johnson,
with QinetiQ

"Open up the gates to children ages 6 to 16 because ultimately they are the ones who are our future."

Brad A. Lawrence,
with United Space Alliance

John F. Kennedy Space Center

Spaceport News

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